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Parts-of-speech systems and morphological types

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Parts-of-speech systems and morphological types[*]

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This paper shows that there are a number of correlations between the parts-of-speech system of a language and the morphological type of that language. It is argued that, from a language-internal perspective, the functional flexibility of lexical items correlates with their formal rigidity, i.e. alternations in the form of a stem do not occur with flexible lexical items. As a consequence, from a cross-linguistic perspective, lexical items that are less likely to be flexible according to the parts-of-speech hierarchy, are also less likely to show formal rigidity, i.e. stem alternation is most likely to occur with verbs, less with nouns, and even less with adjectives.

1   Introduction

Hengeveld, Rijkhoff and Siewierska (2004) show that there are certain correlations between the parts-of-speech system of a language and the word order properties of that language. If a language has a parts-of-speech system that allows lexical elements to be used in more than one propositional function (predication, reference, modification), it resolves the potential functional ambiguity that arises in such a situation by imposing rigid word order patterns. The conclusion that may be drawn from this is that FUNCTIONAL flexibility leads to FORMAL rigidity, i.e. there is a trade-off between lexical and syntactic structure.

This paper investigates whether a similar conclusion may be drawn with respect to the morphological properties of a language, more in particular, the extent to which languages with different parts-of-speech systems allow lexical stems to alternate in form when inflectional categories are attached to them, a crucial property of fusional languages. The prediction is, as in the study mentioned earlier, that intra-linguistically, functionally flexible items will show

formal rigidity, i.e. stem alternation is predicted to be absent with lexical items that can be used in more than one propositional function. Inter-linguistically, this means that propositional functions that are most likely to be expressed by non-flexible lexeme classes according to the parts-of-speech hierarchy are at the same time the most likely ones to exhibit variation in the form of the stem.

The conclusion will be that this is indeed the case, which means that stem alternation is not a property of grammars as a whole, but of certain functional domains within grammars. This ties in with recent work by Plank (1998, 1999) and Haig (fc.), who argue against the holistic conception of agglutination and fusion such as defended earlier by, especially, Skalička (1979), who posited a single connection between parts-of-speech system and morphological type. This study shows that there is indeed a connection between agglutination, fusion, and isolation on the one hand, and parts-of-speech system on the other. However, given that the degree of flexibility of stem classes across propositional functions may differ from one language to the other, the prediction is that the extent to which languages may display stem alternation will also differ. As a result, morphological typology cannot be applied to languages as unified systems, but should rather be applied to specific propositional functions within languages.

This paper is organized as follows. In section 2 I present the framework used to classify parts-of-speech systems. Section 3 briefly goes into the parameters involved in morphological typology, and delimits the area of investigation reported on in this paper. The relation between parts-of-speech systems and morphological types is specified in terms of a number of hypotheses in section 4, which are applied to the sample described in section 5, yielding the results provided in section 6. The paper is rounded off in the concluding section 7.

2   Parts-of-speech

2.1   *Introduction*

For the classification of parts-of-speech systems I base myself on the theory described in Hengeveld, Rijkhoff and Siewierska (2004)[1], itself based on Hengeveld (1992). Hengeveld, Rijkhoff and Siewierska (2004) classify basic and derived lexemes in terms of their distribution across four propositional functions[2], listed in Figure 1.

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[1] For a critical discussion of Hengeveld (1992) see Croft (2000) and Evans and Osada (2005). These criticisms are addressed in Hengeveld and Rijkhoff (2005) and evaluated in detail in van Lier (2006).
[2] The term 'propositional function', taken from Croft (2000), is used here instead of the term 'syntactic slot' used in the original formulation.

	head	*modifier*
predicate phrase	verb	manner adverb
referential phrase	noun	adjective

Figure 1: Lexemes and propositional functions

Figure 1 is based on two parameters, one involving the opposition between predication and reference, the other between heads and modifiers. Together, these two parameters define four propositional functions: head and modifier of a predicate phrase, and head and modifier of a referential phrase.

2.2 *Differentiated, flexible and rigid languages*

The four propositional functions can be illustrated by means of the English sentence in (1).

(1)   The tall$_A$ girl$_N$ sings$_V$ beautifully$_{MAdv}$

English can be said to display separate lexeme classes of verbs, nouns, adjectives and manner adverbs, on the basis of the distribution of these classes across the four propositional functions identified in Figure 1. None of the lexemes in (1) could be used directly in another propositional function. Thus, in this example there is a one-to-one relation between propositional function and lexeme class. Languages of this type are called DIFFERENTIATED LANGUAGES.

There are other languages in which there is no such one-to-one relation between the four propositional functions identified and the lexeme classes available. These languages are of two types. In the first type, a single class of lexemes is used in more than one propositional function. The parts-of-speech system of such a language is called FLEXIBLE. In the second type, classes of lexemes for one or more propositional functions are lacking. The parts-of-speech system of such a language is called RIGID. The following examples illustrate the difference between these two types. In Warao (Chibchan-Paezan; Romero-Figeroa 1997: 49, 50, 119) the same lexical item may be used as the head of a referential phrase (2), as a modifier within a referential phrase (3), and as a modifier within a predicate phrase (4):

(2)   **yakera**
        beauty
        'beauty'

(3)   Hiaka   **yakera**   auka   saba   tai   nisa-n-a-e.
       garment   beauty   daughter   for   she   buy-SG-PUNCT-PAST
       'She bought a beautiful dress for her daughter.'

(4)   Oko   kuana   yaota-te   arone   **yakera**   nahoro-te ...
       we   hardness   work-NPAST   although   beauty   eat-NPAST
       'Although we work hard and eat well, …'

The situation in Garo (Tibeto-Karen; Burling 1961: 27, 33) is rather different. It has classes of nouns and verbs, but not of adjectives and manner adverbs. In order to modify a head noun within a referential phrase, a relative clause has to be formed on the basis of a verbal lexeme, as illustrated in (5) and (6). In (5b), the verb *ca'* 'eat' is turned into the predicate of a relative clause by the addition of the relativizing suffix –*gipa*. The notionally adjectival but morphologically verbal lexeme *da'r* 'big' in (6b) received exactly the same treatment. Thus we can say that the propositional function of modification is achieved in Garo by means of relative clauses, not by lexical modifiers. These relative clauses are built on the basis of verbs, that fulfill the propositional function of predication within the relative clause, in the same way they do in main clauses.

(5)   a.   **Ca'**-gen-ma?
             eat-FUT-INT
             'Will you eat?'

       b.   **ca'**-gipa   man.de.
             eat-REL   man
             'The man who eats.'

(6)   a.   **Da'r**-an-gen.
             big-ITIVE-FUT
             'It will get big.'

       b.   **da'r**-gipa man.de
             big-RELman
             'the big man'

In a similar way, in order to modify a head verb within a predicate phrase, a manner adverbial clause has to be created on the basis of a verbal lexeme, as illustrated in (7) (Burling 1961: 29).

(7)   a. Bi.a   **gar-e**   kat-an-aha
          3.SG   throw-SUB   run-ITIVE-PAST
          'Throwing he ran away.'

      b. **Rak-e**   dok-aha
          strong-SUB   hit-PAST
          'He hit hard.'

The subordinating morpheme *–e* is added to the verb *gar-* 'throw' in (7a) and to the notionally adjectival but morphologically verbal lexeme *rak-* 'strong' in (7b). These verbs fulfil the propsiotional function of predication within the respective subordinate clauses, which as a whole fulfil the function of modification.

The difference between Warao and Garo is thus that Warao has a class of flexible lexical items that may be used in several propositional functions, whereas Garo lacks classes of lexical items for the modifier functions, and has to resort to alternative syntactic strategies to compensate for the absence of a lexical solution. This difference may be represented as in Figure 2.

language	*head of pred. phrase*	*head of ref. phrase*	*modifier of ref. phrase*	*modifier of pred. phrase*
Warao	verb	non-verb		
English	verb	noun	adjective	manner adverb
Garo	verb	noun	-	-

Figure 2: Flexible, differentiated, and rigid languages

As Figure 2 shows, Warao and Garo are similar in that they have two main classes of lexemes. They are radically different, however, in the extent to which one of these classes may be used in the construction of propositions: the Warao class of NON-VERBS may be used in three propositional functions, the Garo class of NOUNS may be used as the head of a referential phrase only. Note that for a language to classify as flexible, the flexibility should not be an accidental property of a subset of the relevant lexeme class, but a general feature of the entire relevant lexeme class.

2.3. Parts-of-speech systems

The arrangement of the propositional functions in Figure 2 is not a coincidence. It reflects the parts-of-speech hierarchy in (8)[3].

(8)   Head of   >   Head of   >   Modifier of   >   Modifier of
       Pred. phrase   Ref. phrase   Ref. phrase   Pred. phrase

The more to the left a propositional function is on this hierarchy, the more likely it is that a language has a separate class of lexemes to realize that function and the more to the right, the less likely this is. The hierarchy is implicational, so that, for example, if a language has a separate class of lexemes to fulfill the function of modifier of a referential phrase, i.e. adjectives, then it will also have separate classes of lexemes for the functions of head of a referential phrase, i.e. nouns, and head of a predicate phrase, i.e. verbs. Similarly, if a language has no class of adjectives, neither will it have a separate class of lexemes for the function of modifier of a predicate phrase, i.e. manner adverbs. Note that the hierarchy makes no claims about adverbs other than those of manner.

The hierarchy in (8), combined with the distinction between flexible and rigid languages, leads to the classification of parts-of-speech systems in Figure 3. Figure 3 shows that languages can display three different degrees of flexibility (systems 1-3), and three different degrees of rigidity (systems 5-7). Of the languages discussed earlier Warao would be a type 2 language, English a type 4 language, and Garo a type 6 language. Note that I use the term 'contentive' for lexical elements that may appear in any of the functions distinguished so far.

PoS system	head of pred. phrase	head of ref. phrase	modifier of ref. phrase	modifier of pred. phrase
1	contentive			
2	verb	non-verb		
3	verb	noun	modifier	
4	verb	noun	adjective	manner adverb
5	verb	noun	adjective	
6	verb	noun		
7	verb			

Figure 3: Parts-of-speech systems

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[3] Hengeveld and van Lier (submitted), argue for a two-dimensional representation of this hierarchy. For the purposes of the current article a one-dimensional hierarchy is sufficient.

Next to the seven types listed in Figure 3, there are intermediate systems, showing characteristics of two neighbouring types. For instance, Turkish has verbs and non-verbs as lexeme classes in its basic lexeme inventory, a type 2 feature, but also displays derivational processes that produce flexible modifiers, a type 3 feature. It is thus classified as a language of type 2/3. As illustrated before, Garo has open classes of verbs and nouns, a type 6 feature, but also a small closed class of adjectives, a type 5 feature, so it is actually classified as a language of type 5/6. Including these intermediate types, there are 13 logically possible types of parts-of-speech system.

3   Morphological typology

3.1   Introduction

In this section I start out giving a general overview of parameters in 3.2, then I take a closer look at the parameter of fusion in 3.3, and then I zoom in on stem alternation, the aspect of fusion that is of central interest to the question addressed in this paper, in 3.4.

3.2   Parameters in morphological typology

In morphological typology three parameters are generally used (see e.g. Comrie 1981, Haspelmath unpubl.). These are listed in (9).

(9)   a. synthesis
        b. fusion
        c. stem combination

The relations between these parameters are given in Figure 4. Starting at the top Figure 4, the first parameter, SYNTHESIS, concerns the question of whether a word can be morphologically complex in a language or not. This distinguishes isolating from non-isolating languages. The second parameter, FUSION, is only relevant to morphologically complex languages, and concerns the question whether there are clear boundaries between the various grammatical and lexical morphemes within a word. This is the distinction between agglutinating and fusional languages. The third parameter, STEM COMBINATION, again only applies to morphologically complex languages, but is equally relevant in agglutinating and fusional languages. This parameter concerns the question whether there may or may not be more than one lexical stem within a word. This distinguishes incorporating from non-incorporating languages.

```
                         morphological type
synthesis:              –                        +
                      isolating            (non-isolating)

fusion:                        –                        +
                          agglutinating             fusional

stem                   –           +           –              +
combination:         non-      incorporating   non-       incorporating
                   incorporating            incorporating
```
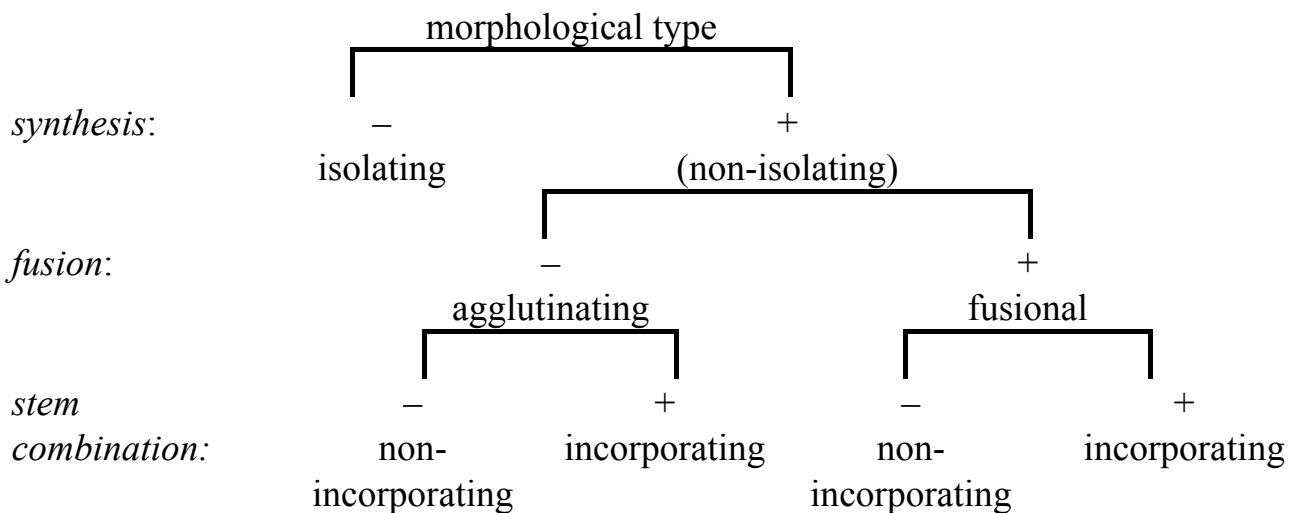
Figure 4: Morphological types

3.3   *Fusion*

The notion of fusion may be applied in different ways (cf. Haspelmath unpubl., Plank 1999). It may refer to CUMULATION, i.e. the expression of more than one grammatical category in one morpheme, or it may refer to STEM ALTERNATION, which obtains when the form of a lexical stem is affected by the expression of a grammatical category. Consider the following examples from Spanish and English, respectively:

(10)   a.   Compr-é.
            buy-IND.PAST.PF.1.SG
            '(I) bought.' (perfective)

       b.   Compr-aba.
            buy-IND.PAST.IMPF.1.SG
            '(I) bought.' (imperfective)

(11)   saw
       see.PAST.SG

The examples in (10a-b) illustrate the phenomenon of cumulation: a single affix expresses five grammatical categories at the same time. Note that at the same time the stem is clearly identifiable. The example in (11) illustrates the phenomenon of stem alternation: a single wordform expresses both lexical and grammatical content, as a result of which the stem cannot be identified

separately. For the research questions considered in this paper, only the stem alternating aspect of fusion is relevant.

3.4   Stem alternation

Two types of stem alternation should be distinguished: (i) phonologically conditioned stem alternation, which is fully predictable on the basis of the phonological properties of stem and affix; (ii) morphologically conditioned stem alternation, which cannot be predicted on the basis of phonology alone, but is sensitive to the (sub)class that the stem or the affix belongs to.[4] Morphologically conditioned stem alternation may take different forms. It may concern (i) morphophonological variation, (ii) irregular stem formation, and (iii) suppletion. Examples of these are:

(i) morphophonological variation: in Hungarian (Uralic-Yukaghir; Kenesei et al. 1998: 439) there is a process of stem-final /t/-palatalization that occurs exclusively before the imperative suffix *–j* and that may take different forms. For instance, when the stemfinal /t/ is preceded by a short vowel, as in (12), /t/ changes into /š/ (ortographically 's').

(12)   köt-   kös-s.
       tie   tie-IMP.INDEF.2.SG

(ii) irregular stem formation: In Kisi (West Atlantic; Tucker Childs 1995: 223, 243) 'roughly 15% of all verbs exhibit ablaut' (Tucker Childs 1995: 241), often used to mark the negative. Compare the regular negation in (13) with the irregular negation in (14):

(13)   a. hûŋ   b. hûŋ   lé
          come.HORT   come.HORT   NEG

(14)   a. baa   b. bee
          hang.HORT   hang.HORT.NEG

---

[4] A less common situation obtains when certain phonological rules obtain within the realm of certain word classes only. This is for instance the case in Turkish, where some fully productive phonological rules only apply to verbs, and others only to non-verbs, mirroring the division of word classes within this language. A similar situation obtains in Guarani, again in consonance with the word class distinctions within the language. These cases are counted as phonologically conditioned stem alternation when they apply across the boundaries of propositional functions.

(iii) suppletion: Wambon (Trans New Guinea; de Vries 1989: 23) may have up to four different verb stem forms depending on the inflectional category that has to be expressed. An example is given in (15):

(15) en-   ande-   na-
      eat(basic stem) eat(past/fut/imp.pl stem)   eat(imp.sg stem)

What all these processes have in common is that there is not a single identifiable stem form that is used under all circumstances, and that the changes in the form of the stem cannot be productively derived on the basis of a phonological rule.

4   Hypothesis

In the light of the parts-of-speech hierarchy described in section 2, and taking into account the remarks on morphological typology in section 3, the following hypothesis may now be formulated:

(16) Hypothesis 1
      The formal integrity of a lexeme, i.e. its formal independence of morphological material specific to a certain propositional function, increases its applicability in various propositional functions. Flexible lexemes are therefore not expected to show morphologically conditioned stem alternation.

It is crucial to note that what this hypothesis establishes is a relationschip between the FUNCTIONAL possibilities of a lexeme on the one hand, and its FORMAL properties on the other. These two features of lexemes are logically independent of one another. Notice further that this hypothesis makes reference to morphologically conditioned stem alternation only, since purely phonologically conditioned stem alternation is fully predictable irrespective of the propositional function in which a lexeme is used. A final point to be made is that, given that the parts-of-speech systems in section 2 are defined on the basis of the functional behaviour of both basic and derived lexemes, this hypothesis will be tested with respect to the behaviour of basic and derived stems in relation to inflectional morphology only.

Given that flexibility comes in different degrees, as described in section 2, hypothesis 1 may be translated into more specific hypotheses depending on the type of parts-of-speech system that a language displays. These specific hypotheses are listed in (17):

(17) Hypothesis 1a
In languages of type 1 morphologically conditioned stem alternation will not occur with lexemes that may be used as heads of predicate phrases.
Hypothesis 1b
In languages of types 1-2 morphologically conditioned stem alternation will not occur with lexemes that may be used as heads of referential phrases;
Hypothesis 1c
In languages of type 1-3 morphologically conditioned stem alternation will not occur with lexemes that may be used as modifiers within referential phrases.
(Hypothesis 1d
In languages of type 1-3 morphologically conditioned stem alternation will not occur with lexemes that may be used as modifiers within predicate phrases.)

Hypothesis 1d is given between brackets since it cannot be tested in what follows, since only very few languages admit the expression of grammatical categories on manner expressions. Taking this restriction into account, the predictions with respect to the occurrence of stem alternation (SA) for the remaining propositional functions can be schematically represented as in Figure 5.

PoS	head of pred. phrase	head of ref. phrase	modifier of ref. phrase
1			
1/2-2		SA disallowed	
2/3-3			
3/4-4	SA allowed		
4/5-5			
5/6			
6			SA irrelevant
6/7			
7			

Figure 5: The hypotheses

Figure 5 indicates where stem alternation (SA) is allowed and disallowed according to the hypotheses. It also indicates where the issue is irrelevant. This is the case for those propositional functions that cannot be realized through lexical means in certain types of parts-of-speech system.

There is a large space in Figure 5 where SA is allowed, i.e. it may or may not occur. Our second hypothesis predicts that, crosslinguistically, the distribution of functions within this space is not random, but can be related to the parts-of-speech hierarchy introduced in section 2.3 and repeated here for convenience:

(18)   Head of   >   Head of   >   Modifier of   >   (Modifier of)
       Pred. phrase   Ref. phrase   Ref. phrase   (Pred. phrase)

This second hypothesis may be formulated as follows:

(19)   Hypothesis 2
       In those cases in which stem alternation is allowed by hypothesis 1, the more to the left a propositional function is on the parts-of-speech hierarchy, the more likely the lexemes fulfilling that function are to display stem alternation.

As argued above, hypothesis 1 predicts that stem alternation is possible only in the case of specialized lexeme classes dedicated to a single propositional function. At the same time, the parts-of-speech hierarchy predicts that classes fulfilling functions more to the left in the parts-of-speech hierarchy are the most likely ones to constitute specialized lexeme classes. Hypothesis 2 captures the combined effect of these two predictions.

The two hypotheses will be tested in section 6, after a presentation of the language sample.

5   The sample

The sample used to test the aforementioned hypothesis is given in Table 1. It is a 50-language sample constructed using the method described in Rijkhoff, Bakker, Hengeveld and Kahrel (1993). For 4 languages (Etruscan, Hurrian, Meroitic, Nahali) insufficient data are available, so that the actual sample consists of 46 languages.

Given the nature of the research question, the typological resspresentativity of the sample as regards the parts-of-speech systems of the languages involved is an important factor. The distribution of parts-of-speech systems across the sample languages is given in Table 2.

Table 1. *The sample*

Classification				Language
Afro-Asiatic (2)	Chadic (1)			Gude
	Cushitic (1)			Oromo
Altaic (1)				Turkish
Amerind (7)	Northern (2)	Almosan-Keresiouan (1)		Tuscarora
		Penutian (1)		Koasati
	Andean (1)			Quechua, Huallaga
	Equatorial-Tucanoan (1)			Guaraní
	Ge-Pano-Carib (1)			Hixkaryana
	Central Amerind (1)			Pipil
	Chibchan-Paezan (1)			Warao
Australian (3)	Gunwinyguan (1)			Ngalakan
	Pama-nyungan (1)			Kayardild
	Nunggubuyu (1)			Nunggubuyu
Austric (5)	Austro-Tai (3)	Daic (1)		Nung
		Austronesian (2)	Mal.-Pol. (1)	Samoan
			Paiwanic (1)	Paiwan
	Austroasiatic (1)			Mundari
	Miao-Yao (1)			Miao
Basque (1)				Basque
Burushaski (1)				Burushaski, Hunza
Caucasian (1)				Abkhaz
Chukchi-Kamchatkan (1)				Itelmen
Elamo-Dravidian (1)				Tamil
Eskimo-Aleut (1)				West Greenlandic
Etruscan (1)				(Etruscan)
Nivkh (1)				Nivkh
Hurrian (1)				(Hurrian)
Indo-Hittite (2)	Indo-European (1)			Polish
	Anatolian (1)			Hittite
Indo-Pacific (5)	Trans New Guinea (1)			Wambon
	Sepik-Ramu (1)			Alamblak
	East Papuan (1)			Nasioi
	West Papuan (1)			Sahu
	Torricelli (1)			Mountain Arapesh
Ket (1)				Ket
Khoisan (1)				Nama Hottentot
Meroitic (1)				(Meroitic)
Na-Dene (1)				Navaho
Nahali (1)				(Nahali)
Niger-Kord. (4)	Niger-Congo (3)	N-C Proper (2)	Centr. N-C (1)	Babungo
			W Atlantic (1)	Kisi
		Mande (1)		Bambara
	Kordofanian (1)			Krongo
Nilo-Saharan (2)	East Sudanic (1)			Lango
	Central Sudanic (1)			Ngiti
Pidgins & Creoles (1)				Berbice Dutch
Sino-Tibetan (2)	Sinitic (1)			Chinese, Mandarin
	Tibeto-Karen (1)			Garo
Sumerian (1)				Sumerian
Uralic-Yukaghir (1)				Hungarian

Table 2. Parts-of-speech systems of the languages of the sample

PoS	Languages
1	Samoan
1/2	Guaraní, Mundari
2	Quechua (Huallaga), Warao
2/3	Turkish
3	Ket, Miao, Ngiti
3/4	Lango
4	Abkhaz, Arapesh, Babungo, Bambara, Basque, Burushaski (Hunza), Hittite, Hungarian, Itelmen, Nama
4/5	Ngalakan, Polish
5	Koasati, Nasioi, Paiwan, Pipil, Sahu, Sumerian Alamblak, Berbice Dutch, Kayardild, Kisi
5/6	Oromo Wambon
6	Chinese (Mandarin), Garo, Gude, Nung, Tamil
6/7	West-Greenlandic Hixkaryana, Krongo, Navaho, Nivkh, Nunggubuyu, Tuscarora

Note that given the scarcity of languages of certain types, the various types of parts-of-speech systems are not represented evenly.

6   Results

6.1   *The data*

The data concerning stem alternation in the languages of the sample are listed in Table 3. In Table 3 a 'Ø' indicates the absence of stem alternation due to isolating morphology, a '–' indicates the absence of stem alternation due to agglutinating morphology, and a '+' indicates the presence of stem alternation due to fusional morphology. Notice that, of necessity, stem alternation cannot obtain with isolating morphology, since this involves the expression of grammatical categories as separate words. As a result, both 'Ø' and '–' indicate absence of stem alternation, in contrast with '+', which indicates the presence of stem alternation.

Table 3. *The data*

Language	PoS	H. Pr.Phr.	H.Ref.Phr	M.Ref.Phr
Samoan	1	Ø	Ø	Ø
Mundari	1/2	–/+	–	Ø
Guaraní	1/2	–/+	–	–
Warao	2	–	–	–
Quechua (Huallaga)	2	–/+	–	–
Turkish	2/3	–/+	–	–
Miao	3	Ø	Ø	Ø
Ket	3	–/+	–/+	–
Ngiti	3	–/+	–/+	–
Lango	3/4	–/+	–/+	–/+
Nama	4	–	–	–
Ngalakan	4	–(1+)	–	–
Abkhaz	4	–/+	–	–
Arapesh	4	–/+	–	–
Basque	4	–/+	–	–
Itelmen	4	–/+	–	–
Burushaski (Hunza)	4	–/+	–/+	–
Hungarian	4	–/+	–/+	–
Babungo	4	–/+	–/+	–/+
Bambara	4	–/+	–/+	–/+
Hittite	4	–/+	–/+	–/+
Polish	4	–/+	–/+	–/+
Sahu	4/5	–	Ø	Ø
Paiwan	4/5	–/Ø	Ø	Ø
Sumerian	4/5	–/+	–	–
Koasati	4/5	–/+	–/+	Ø
Pipil	4/5	–/+	–/+	–
Nasioi	4/5	–/+	–/+	–/+
Berbice Dutch	5	–/Ø	–/Ø	Ø
Kayardild	5	–	–	–
Alamblak	5	–/+	–	–
Kisi	5	–/+	–/+	–
Oromo	5	–/+	–/+	–
Wambon	5	–/+	–/+	–
Nung	5/6	Ø	Ø	Ø
Chinese (Mandarin)	5/6	–/Ø	–/Ø	Ø
Garo	5/6	–	–	–
Tamil	5/6	–/+	–/+	Ø
West Greenlandic	5/6	–/+	–/+	Ø
Gude	5/6	–/+	–/+	–
Nivkh	6	–/+	–/+	IRR
Hixkaryana	6	–/+	–/+	IRR
Krongo	6	–/+	–/+	IRR
Navaho	6	–/+	–/+	IRR
Nunggubuyu	6	–/+	–/+	IRR
Tuscarora	6/7	–/+	–	IRR

6.2   *Testing the hypotheses*

Although, as stated earlier, not all types are represented equally in the sample and the results can therefore only be considered to be preliminary, the data in Table 3 first of all confirm hypothesis 1 and its specific instantiations formulated in section 4, in the following ways:

(i) in languages of type 1 there is no stem alternation at all;

(ii) in languages of types 1/2-2 there is no stem alternation with lexemes that are used as heads of referential phrases or as modifiers within referential phrases. At the same time, there may or may not be stem alternation with lexemes that are used as heads of predicate phrases, e.g. there is in Huallaga Quechua, while there isn't in Warao;

(iii) in languages of type 2/3-3 there is no stem alternation with lexemes that may be used as modifiers within referential phrases. At the same time, there may or may not be stem alternation with lexemes that are used as heads of predicate phrases and as heads of referential phrases, e.g. there is in Ngiti, there isn't in Miao;

(iv) in languages of type 3/4-7 there may or may not be stem alternation for any of the relevant propositional functions, e.g. there is in Babungo, there isn't in Nama.

Hypothesis 2 formulated in section 4 is also confirmed. The data in Table 3 clearly show that in those cases in which stem alternation is allowed according to hypothesis 1, the presence or absence of stem alternation across functions can be predicted using the parts-of-speech hierarchy introduced in section 2.3 and reflected in the organization of Table 3. If a language allows stem alternation with lexemes used in a propositional function more to the right in the hierarchy, it will also allow stem alternation in propositional functions more to the left in the hierarchy, and conversely. Verbs are thus the most likely candidates for stem alternation, followed by nouns, adjectives, and, trivially, manner adverbs.

7   Conclusions

This paper has shown that there is a clear connection between the parts-of-speech system of a language and the morphological profile of that language. The study confirms claims by Plank (1998,1999) and Haig (unpubl.) that there is no overall correlation between the morphological type of a language and other features of that language. However, I hope to have shown that new typological insights may be obtained when (i) component features of morphological types are taken as the point of departure, in this case the presence or absence of stem alternation, and (ii) the characterization in terms of morphological type is not applied to languages in their entirety, but to individual propositional functions

within those languages. This way, a functionally motivated correlation has shown up between the flexibility of lexical items and the absence of stem alternation of these items, as well as an implicational generalization concerning the question which parts-of-speech are more likely to partake in stem alternation than others.

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